Power Press and Drop Stamping Problems in the Cutlery and Silverware Trades in Sheffield and District

Introduction

1. The working party was appointed at the meeting of representatives of the Sheffield Cutlery and Silverware Trades and the Power Press Joint Standing Committee on Safety in the Use of Power Presses, held in Birmingham on 14th May 1965.

The members of the working party, who were nominated at the meeting, were:

Mr. H. Bright —Secretary, National Union of General and Municipal Workers (Cutlery Branch)
Mr. E. A. Oldfield —Director of Research, The Cutlery and Allied Trades Research Association
Mr. W. H. L. Brogden—Chief Safety Engineer, Pressed Steel Company Ltd.
Mr. E. G. Hands —Chief Automation Engineer, Fisher & Ludlow Ltd.
Mr. H. Calderbank —H.M. Engineering Inspector of Factories, Sheffield

TERMS OF REFERENCE

2. The terms of reference for the working party agreed at the Birmingham meeting were:

> "To study at manufacturers' premises the various operations generally undertaken in the trade with a view to solving the difficulties outlined in the Report of the Joint Advisory Committee for the Cutlery and Silverware trades, and to report their findings and recommendations by 30th November 1965."

3. Arrangements were made for the members of the working party to visit firms in the Sheffield area and during meetings held on 2nd July and 12th October 1965 they visited five factories to study the various process operations typical of the trade. Opportunity was afforded during the meetings for the collective discussion of individual comments and suggestions, from which this Report, outlining the general findings and recommendations of the working party, was prepared.

SCOPE OF INVESTIGATION

4. It was considered that particular power press and drop stamping problems should be studied in conjunction with preliminary and subsequent processes and opportunity was therefore taken of seeing the full range of operations from bar cropping to finish forming. The Report of the Joint Advisory Committee for the Cutlery and Silverware Trades in Sheffield and District had revealed specific problems in the case of power press operations; the Joint Advisory Committee

recommendations in respect of the study of drop forging operations were, however, more general in scope.

5. The working party also considered that its recommendations should be consistent with the production techniques and machines in general use by the trade.

Operations at Drop Forging Machines

FINDINGS

Hot Stamping of Forged Blanks (*Hot Forging of Scissors and Knife Blanks, etc.*)

6. The machines and operations were found to be typical of those existing in the drop forging industries generally, no special hazard or problem being apparent.

Cold Forming with Drop Stamps

7. The "difficult" operations are *spoon bowling, fork bending and handle forming* and these operations were closely studied. In all cases high production rates were found to be involved and, although the use of a guard would seem to be practicable, it was generally concluded that without the use of automatic feeding devices such a fitting would interfere with output rates, particularly in the case of continuous acting machines at which spoons and forks are fed and taken off by hand at an exceptionally high rate.

8. Although many of the cold forming operations could be carried out on friction screw and knuckle presses for which interlocked guards are available, it is appreciated that output rates at some of these machines do not compare favourably with those at drop stamps. Unskilled labour could, however, be used whereas a high degree of training and skill is required for the drop stamp operations.

9. (*a*) Particular concern was expressed in respect of cold stamping operations. It was apparent in many cases that there was a serious risk of the operator being accidentally pushed against the falling tup owing to the inadequate spacing of the drop stamps in relation to other machines, working places and gangways. There was also a similar risk of persons other than the operator coming into contact with the moving tup from behind the machine.

(*b*) The repeat mechanism tripping pegs attached to the tups on some of the continuous acting machines seen in use were projecting so as to pass dangerously close to the heads of the operators.

10. It was noted that in some cases the actuation of propping catches to the scotching position was dependent upon return-spring action and that there was insufficient location of props and catches at some machines.

RECOMMENDATIONS

11. The following recommendations are made to deal with problems arising from "cold" stamping operations:

(*a*) Consideration should be given to the provision of barriers in front of and behind the machines to prevent passers-by colliding with the operator, or approaching dangerously close to the tup from the back of the machine.

(*b*) In cases where it is possible by simple modification, the tripping gear of continuous acting drop stamps and board hammers should be mounted on the side of the machine remote from the operator. It is also recommended that this matter should be discussed with machine manufacturers.

(*c*) Props and catches should be arranged so that they are positively engaged. Return spring bias should not be used as the sole means for engaging a prop or a catch. The recommendations with respect to design and maintenance of scotching equipment as given in the Ministry of Labour Safety, Health and Welfare Booklet "Drop Forging Hammers: Props and Catches", New Series No. 12, should be adopted as minimum standards.

(*d*) Experimental work with the use of "fixed" guards should be undertaken. In this connection, if it is to be fully satisfactory it would seem desirable that a guard should incorporate an interlock arrangement to ensure that scotches are "home" while the guard is out of position for setting operations, etc.

Operations at Power Presses

FINDINGS

12. The difficult operations referred to in the Joint Advisory Committee report are:

(*a*) *Tanging and Cutting-out of Table and Butcher Blades*

The Summary on Page 39 of the Joint Advisory Committee Report reads:

> "It seems that the tanging and cutting-out operations on table blades merit more detailed investigation.
>
> Cutting-out of butcher and similar large blades is carried on by a few firms, and is not therefore a general problem but the operation merits further investigation."

(*b*) *Shank and Bow Clipping and Blade Clipping of Scissors Blanks*

The fourth main paragraph on Page 42 of the Joint Advisory Committee Report reads:

> "An additional difficulty in the clipping of bow and shank is the need for twisting and tipping the clipped blank in order to free it and eject it through the bottom tool. . . ."

Tanging and Cutting-out of Table and Butcher Blades

13. The preliminary operation of hot rolling to draw out the blade causes blanks to vary in shape to such an extent that manual feeding is necessary. This was accepted by the working party who studied the question of guarding with this major problem in mind.

14. The usual method of holding the blank by hand during the working stroke was investigated in conjunction with the normal tool arrangement consisting of an open-ended bottom die, top punch and finger stripper. It was apparent that from the production and safety point of view, there should be no sticking of the work piece in the bottom die.

Shank and Bow Clipping and Blade Clipping of Scissors Blanks

15. The preliminary operations in this case are such that reasonably uniform blanks should be produced. The location of scissors blanks up to about 9 inches long presents no apparent difficulty special to the trade. The shape of the blank which involves a relatively small cross-sectional area (at the shank) in relation to the length and weight of the blank does, however, lead to difficulties caused by distortion after forging. It was, therefore, appreciated that location problems could arise in the case of blanks exceeding 9 inches in length.

16. The clipping of shank and bow at one operation has many advantages over the two-operation method. A general objection put forward by the trade was that full profile tools were considerably more expensive than paired sets and more liable to fracture at critical points.

RECOMMENDATIONS

Tanging of Table and Butcher Blades

17. (*a*) When considering the normal method of holding the blank during the working stroke it was apparent that from the production and safety point of view, there should be no sticking of the work piece in the bottom die. A liberal relief angle should therefore be provided to ensure adequate clearance in the die throat; accordingly the punch should pass through the die a distance sufficient to positively free the blank from the die.

(*b*) Since the use of a closed tool arrangement would present difficulties with respect to location of the work piece which has to be visually positioned over the die, it is recommended that a fixed guard be used for this operation. The fixed enclosure should be of cage formation, constructed as a universal unit to suit all ranges of work involved and should incorporate an access opening with fixings for attaching adaptor shields. The shields should be designed to suit individual set-ups. The guard should afford good visibility of the die area and in this connection adequate local lighting within the guard should be provided. With an enclosure of this type manual removal of fash would be somewhat difficult; the guard should therefore be used in conjunction with automatic fash stripping and ejection equipment. In some cases it will be necessary for a sliding panel, as described in the Joint Advisory Committee Report, para. 5, page 42, to be incorporated in the adaptor member.

Cutting-out of Table and Butcher Blades

18. This operation is basically similar to that of tanging; the same type of guard arrangement incorporating auto-scrap ejection should be used.

Shank and Bow Clipping and Blade Clipping of Scissors Blanks

19. (*a*) As indicated in paragraph 16 above, the clipping of shank and bow at one operation has many advantages over the two-operation method although, as the trade point out, full profile tools are considerably more expensive than paired sets and more liable to fracture at critical points. It is recommended that single operation trimming be adopted. For this

purpose the use of composite tools with replaceable inserts at the points where chipping is likely to occur is recommended for consideration.

(*b*) Interlocked guards can be used for the full blanking operation though there may be some difficulty in holding distorted blanks in position after location; it is therefore suggested that the trade might experiment with the use of magnetised bottom dies or inserts for the purpose of holding pre-positioned blanks after the closing of the guard gate.

(*c*) It is accepted that some of the larger scissors blanks will be supplied from the forges in such a condition as to necessitate the two-operation manual feed method similar to that used for table blade trimming. The recommendations in respect of die clearance, the use of fixed guard arrangements and the automatic fash ejection as recommended for table blade operations should be adopted in these cases. It will also be necessary for the bottom die to be relieved sufficiently at the throat to permit withdrawal of the work piece after trimming.

General

INTERLOCKED GUARDS

20. The use of an interlocked guard is recommended in connection with scissors blanks trimming and as a large proportion of this work is undertaken on "Sheffield" type presses it was considered that an opportunity should be taken of examining this press to assess its characteristics from the point of view of guarding.

21. A "Sheffield" machine with a proprietary interlocked guard fitted was demonstrated to the working party members and was considered to be generally satisfactory. Two proprietary interlocked guards by reputable manufacturers are available for this type of machine.

AUTOMATIC FASH EJECTION

22. Pneumatic fash ejection has been in use for a considerable time on similar operations to those for which it has been recommended in this report. A short blast of air at about 80 lb. per square inch through a single nozzle opening set adjacent to the die and opposite a simple discharge chute is all that is normally required. The pneumatic valve is normally triggered by the ram during the upstroke immediately after the fash has been stripped. Cutting of the stripped fash is not usually necessary but a simple form of cutter could, if required, be incorporated in the tool arrangement. Alternatively the fitting of mechanical ejection equipment should be considered. It is recommended that development work should be undertaken in this field.

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MINISTRY OF LABOUR

Power Press and Drop Stamping Problems

in the Cutlery and Silverware Trades in Sheffield and District

Report of the Working Party representing the Joint Standing Committee on Safety in the Use of Power Presses and the Cutlery and Silverware Trades in Sheffield and District

LONDON
HER MAJESTY'S STATIONERY OFFICE
1967

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Report
# of the Working Party representing the Joint Standing Committee on Safety in the Use of Power Presses and the Cutlery and Silverware Trades in Sheffield and District

To the Rt. Hon. R. J. GUNTER, M.P.,
Minister of Labour

Sir,

We have the honour to present to you the Report of a working party appointed in May 1965 to look into the safeguarding of power press and stamping operations in the Cutlery and Silverware Trades in Sheffield and District.

In its Report, which was presented to your predecessor in 1964 and published in that year, the Joint Advisory Committee for the Cutlery and Silverware Trades in Sheffield and District reviewed, amongst other matters, the problem of the guarding of power presses and drop stamps in those trades.

Whilst the Joint Advisory Committee did not examine in detail the operations carried out on power presses, or the types of presses used, its findings showed that guarding was not in general provided and maintained for power presses in accordance with the recommendations contained in the various Reports issued by the Joint Standing Committee on Safety in the Use of Power Presses. Statistics quoted in the Joint Advisory Committee's Report showed that half the accidents at the tools of power presses occurred through the absence of fencing and a smaller proportion of them through inadequate or improperly maintained guards. It was appreciated however that compliance with these recommendations presented some difficulty and the Joint Advisory Committee concluded that an investigation into press guarding problems appeared to be necessary, a task which in its view could best be done by the Joint Standing Committee on Safety in the Use of Power Presses.

When investigating the use of Drop Stamps, the Joint Advisory Committee noted that for various cold pressing operations, particularly in the spoon and fork trade, drop stamps, friction-screw presses and knuckle presses were used indiscriminately and arbitrarily; the safety problems associated with drop stamps were, therefore, comparable with those arising at power presses. It was thought, therefore, that the assistance of the Joint Standing Committee might also, with advantage, be sought to examine the problems arising during cold stamping work in the cutlery and silverware trades.

With the above considerations in mind, a meeting between representatives of the Joint Standing Committee on Safety in the Use of Power Presses and of the Sheffield and District Cutlery and Silverware Trades was held in Birmingham on 14th May 1965 at which the problems needing investigation were assessed, the terms of reference agreed and a working party appointed.

Meetings of the Working Party were held in July and October 1965, in the course of which several firms in the Sheffield area were visited and the full range of process operations typical of the trades in question were seen. The Working Party duly submitted its findings and recommendations to us in the form of a Report which we now present to you.

The Report covers hot stamping operations as well as cold forming operations with drop stamps and other cold operations performed with power presses. All the operations were closely examined and evaluated and recommendations made where appropriate, particular attention being paid to operations referred to in the Joint Advisory Committee's Report as being difficult to safeguard.

The conditions obtaining during the hot stamping of forged blanks were found to be typical of those existing in the drop forging industries generally and no recommendations were made.

The "difficult" operations which are performed "cold" involve both drop stamps and power presses and separate recommendations are made for each of these two types of machines. A particularly important recommendation is that power presses used in connection with scissors blank trimming, a process which is largely undertaken on "Sheffield" type presses, should be equipped with interlocked guards. The recommendation that development work should be undertaken in the field of automatic fash ejection is also important because effective stripping and automatic ejection of fash will reduce the need for manual approach to the tools and facilitate the adoption of a high standard of guarding. We also feel that the Trades should consider extending the present limited use of automatic feeding equipment even though this may necessitate reconsideration of the techniques adopted in forging or other preliminary operations and the replacement of drop stamps by power presses.

We are indebted to the members of the Working Party for their Report and agree with the findings and recommendations therein. We feel that the adoption of these recommendations would make a substantial contribution to the safe use of drop stamps and power presses in the cutlery and silverware trades. The Report can, however, only be regarded as a beginning; we propose to keep the matter under review.

We have the honour to be, Sir,

Your obedient Servants,

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